

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
A428
En8B

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY



Reserve
BOOK NUMBER

A428
En8B

3 0

The Biological Basis of Sterilization on Account of
the Mediterranean Fruit Fly

C. L. Marlatt,
Chief, Bureau of Entomology.



The point of view, that the present fruit fly situation in Florida is such that sterilization is no longer necessitated and that this requirement can be withdrawn without risk, has recently been widely exploited and apparently is being rather generally accepted in Florida. The apparent scarcity of the fly is offered in support of this view, namely, the indication that the fly has been completely eradicated, so far as concerns the movement of the present crop. This point of view, in the judgment of the Department, is unsound biologically and involves risks which ought not to be accepted--risks which may greatly increase as the season advances.

Origin of Sterilization Requirement.

It was of immediate and great service to Florida and a tremendous aid to the eradication effort that, in the course of the research work of the Department, methods of sterilization--by refrigeration and by heat--were developed, by the use of which, after cleanup and spraying and an adequate quarantine period, any residual fly risk could be eliminated as to fruit produced in areas formerly infested or in areas under suspicion of possible infestation. It will be recalled that the nation-wide advisory committee appointed by the Secretary of Agriculture last July, after a thorough survey of the situation in Florida, recommended that sterilization should be required as a condition of interstate movement for all host fruits and vegetables, not only from the eradication area but from all parts of Florida. This recommendation was based on the recognized possibility that the fly might be much more widespread than had been determined, and that the detection of the presence of eggs or larvae in fruit and vegetables by inspection is uncertain, and, therefore, that reliance on inspection would involve continuing risk of spreading the pest. The committee pointed out also that, in their judgment, under such treatment it would be unnecessary to carry out the destruction, which had been provided for up to that time in both State and Federal regulations, of a very important element of the crop of 1929-30 then developing in the old infested areas, and also that the treatment offered a means of greatly broadening the possibilities of safe marketing of Florida fruits and vegetables, including even movement of such products into southern and western States.

The Heat Method of Sterilization.

Of these methods of sterilization, the one by heat has assumed the greatest practical and commercial importance on account of its comparatively small cost and ease of installation and application. This method has already been installed in some 40% of the commercial packing houses in the eradication area and in several houses outside of this area, making it possible to treat upwards of 200 carloads of fruit per day.

Sterilization Not Injurious to Good Fruit.

As to effect of the treatment on the fruit, it is perfectly clear from the very thorough investigation which the Department has made of the subject, including tests in which a great many people have cooperated, that the heat treatment does not make "bad fruit out of good fruit"; but, on the other hand, it unfortunately does not make good fruit out of bad fruit! That much of the citrus fruit of Florida is this year below its normal standard is generally admitted, but this condition, as is well recognized, must be ascribed to several causes, many of which have no relation whatever to any operations in the fruit fly campaign. Nevertheless all delinquencies of fruit are commonly ascribed to the eradication campaign--at the outset to the arsenical baiting of trees, but now in large part and entirely without justification, to the heat method of sterilization!. That grapefruit is uninjured by this treatment is generally admitted, and it is a matter of common proof that good oranges, including tangerines, are not injured. In a way it would be most unfortunate for Florida if the sterilization requirement should be withdrawn, for the public would then discover that the excuse of sterilization has no standing!

Need for Continuation of Sterilization Requirement.

(a) Probabilities of Fly Survival.

The need for the present requirement of sterilization is based on the biological probabilities concerning the survival and present status of the fruit fly in Florida--probabilities which amount to substantial certainties. An examination of these probabilities and of the known behavior of this insect in other countries leads to the inescapable conclusion that there are now, probably at widely separated points in the State, incipient infestations such as the one discovered November 16th last. The finding of infestations in the beginning stages is a very difficult matter and involves intensive inspection of orchards, tree by tree, and the examination of vast quantities of fruit. Due to the shortage of funds since July, and the vast area and enormous quantity of fruit concerned, this type of investigation has been at best only superficial and it was by the purest accident that the single infested fruit was discovered in November.

(b) Response of the Fly to Seasonal Conditions.

The failure to find the fly at this time--after an intensive eradication campaign, a warm rainy season which is very destructive to fly life, followed by the winter season when the breeding and other activities of the insect are at a low cbb, is the weakest sort of basis for a belief that the fly is eradicated. With the amount of inspection which it has been possible to make during the last three months, such belief is based more on ignorance than on adequate information. As to present conditions, at least this can be said with certainty, that every point of infestation which may and probably will be disclosed in March and April must now have existence in Florida in a beginning stage. We must recognize, therefore, the probability that some of the fruit now moving from Florida is under the risk of being infested. The adoption of some means for the elimination of that risk is imperative if spread of the pest is to be prevented.

Concessions of the Department Re Sterilization.

In connection with this discussion of the subject of sterilization, it may here be pointed out that the attitude of the Department from the beginning has been to provide for the freest movement, possible with safety, of host fruits and vegetables. As examples of such attitude, reference may be made to the release from the requirement of sterilization of portions of the State outside of the eradication area, and also within the eradication area for movement to a considerable group of northeastern States, the provision for movement into the South, and to the provision for sterilization at northern destinations.

To Florida, the most important of these concessions was the designation by the Department at the very outset of a group of northeastern States into which movement of fruit and vegetables from the eradication area was permitted without sterilization. In doing this, it was recognized at the time that the Department was accepting a risk of spreading the fruit fly to these areas, particularly as to New Jersey and Delaware. The need was to prevent fruit from a considerable area in Florida being bottled up altogether pending installation of adequate sterilization equipment. The justification was that this northeastern area was farthest removed from regions of greater risk. In taking this step, the Department was compelled to assume the responsibility for having balanced the risk on the one hand against the losses to Florida on the other. The seriousness of the risk thus assumed was more fully disclosed by the capture, at a period when the peach crop of the area was about to ripen, of several Mediterranean fruit flies at Raleigh, North Carolina, in a shop which had handled Florida fruit.

Fruit Fly Risk in Northern States.

The nature of the risk to the Northern States involves another biological phase which apparently is not understood. While it is unlikely that the fruit fly would overwinter if actually subjected to the out-of-door temperatures which characterize the States north of the Cotton Belt, it must be remembered that in winter fruit and vegetables are not kept out of doors but in situations favorable to the hibernation and survival of the larvae and pupae coming from infested unsterilized fruit, namely, in storage, in fruit shops, and in homes. In such situations, the larvae and pupae could remain until favorable outdoor temperatures existed for transformation and emergence as adult flies. Furthermore, the latter have the power to live for many months, sometimes nearly a year. These conditions might readily lead to summer and fall infestation of peach or any other deciduous fruits grown in these States. The rapidity also with which this insect develops makes it entirely possible that it could increase in the North during a single season in such numbers as not only to occasion serious damage locally but to lead to its spread into States to the south, where it could gain firm and continuing foothold. To this should be added the further risk of illegal retransportation of Florida fruit from such northern areas southward. Such movement as to large bulk by rail could probably be prevented, but there would be no means of stopping the carriage of smaller quantities of such fruit by individuals or by truck.

The acceptance by the Department, as to Northeastern States, of the risk and responsibility therefor has, by misinterpretation, been used as the chief argument for the elimination of the requirement of sterilization as a condition for movement into the middle western and even into the Southern States. As already indicated, it was fully realized that the opportunity for fruit fly development, during the summer and fall, was just as favorable in certain of the northeastern States--in important peach-growing areas, for example--as in States farther west, the only difference being that of geographical position in relation to areas of greater risk. The withholding of the requirement of sterilization for this area having served its immediate purpose, and the facilities for treatment having become generally available, there would seem to be no good reason why the requirement of sterilization should not now be enforced as to the Eastern area, thus eliminating further assumption of risk and putting all of the Northern States on equality.

The necessity for continuing and possibly expanding the sterilization requirement is strengthened by the fact that the Department has been obliged, from lack of funds, to discontinue the cleanup of abandoned properties in Florida and also spraying operations, and to some extent the supervision of the weekly cleanup of drops and windfalls, thus greatly enhancing the opportunity of breeding and development of any flies which may still remain in the State. As the season progresses and the fruit fly risk increases, conditions may develop which will indicate the need of sterilization of all host fruits and vegetables leaving Florida, as recommended by the nation-wide committee of specialists already referred to.

Conclusion.

Certain biological conditions and factors have been discussed in this statement for the purpose of explaining the need for the present of continuing the requirement of sterilization of host fruits and vegetables of the Mediterranean fruit fly, and even perhaps of extending that requirement when and if such need becomes clearly evident. As long, therefore, as such sterilization is vitally necessary for eradication and prevention of spread, this requirement should be enforced. The Department, however, should stand ready, as it has hitherto, to lessen the requirement as rapidly as safety permits, and not to postpone complete withdrawal beyond the dictates of clear biological necessities.

February 10, 1930.

